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3,462,995

## AERIAL PROSPECTING

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### ABSTRACT OF THE DISCLOSURE

Airborne mineral particles are collected with high efficiency, in the course of mineral prospecting by correlation of airborne particle position to particle analysis and concentration, upon threads of nylon or other synthetic fibers towed from aircraft.

### BACKGROUND OF THE INVENTION

There is described in U.S. Patent 3,309,518 a method of prospecting an area of the earth's crust for solid metalliferous mineral deposits existing therein by collecting on separate collector surfaces successive samples of airborne particles at a plurality of different positions above the earth's surface, determining the positions at which each of the samples are collected relative to the earth's surface, analyzing each sample for element content, number and size of the particles, and correlating the results of the analysis with determined positions of collection to determine the position of mineral deposits in the earth's crust.

A preferred method for collecting airborne mineral particles described in U.S. 3,309,518 uses membrane filters and the analysis of collected mineral particles is accomplished by dissolving the membrane filters to leave a solution with undissolved mineral particles suspended therein from which the particles may be centrifuged for concentration or alternatively concentrated by filtration. As further explained in the patent, the number of particles captured on membrane filters is of the order of 60 to 100 mineral particles per square inch at short collecting periods of a few minutes.

It has now been found that the small number of particles which collect upon membrane filters and further loss of particles in the course of their concentration by dissolving the filters leaving a suspension of mineral particles for subsequent analysis and identification is tedious and costly. Hence, to render the general methods of aerial prospecting as described in the patent more efficient and to reduce the time and cost of conducting such prospecting, it has been found desirable to have available some improved means for collecting airborne particles and some improved method of concentrating the particles so collected for subsequent analysis and correlation with data on position of collection.

### OBJECTS

A principal object of this invention is the provision of improvements in aerial prospecting methods to determine position of mineral deposits in the earth's crust.

Further objects include the provision of:

(1) Information for improving the efficiency of collection of airborne mineral particles for use in aerial prospecting methods as disclosed in U.S. 3,309,518.

(2) New devices for collection of airborne mineral particles which are of simple construction, involve expendable elements of extremely low cost and which enable concentration of collected particles to be accomplished in a quick and easy manner.

(3) New methods for collecting airborne mineral particles in which the collected particles may be concentrated for analysis without need to use solvents or other liquid solutions or suspensions of particles.

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Other objects and further scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

### SUMMARY OF THE INVENTION

These objects are accomplished according to the present invention by a method of aerial prospecting involving airborne collection of mineral particles with subsequent concentration of collected particles followed by analysis of collected particles and correlation of analysis data to geographical position of airborne collection by collecting airborne particles upon threads of synthetic polymer material. The synthetic polymer threads may be passed in the airborne collection procedure as a single strand at a desired height above the ground or, alternatively, the synthetic polymer threads may be stretched across a frame so that a plurality of sections of the thread spaced apart from one another form an open strand configuration which may be towed behind and below an aircraft flying at a suitable height, e.g., 500 to 1000 feet above the ground.

Success of the present invention is due in part to the discovery that fine threads of nylon or equivalent synthetic polymer material, act as highly efficient collectors of mineral particles when passed through air at elevated altitudes and at the high velocities of aircraft. It has been found that the distortion of air flow and the interference of boundary layers in the capturing and retaining of particle aerosols is substantially reduced as compared with membrane collectors. It appears that the strong static electric charges developed by fine threads or fibers of nylon or equivalent synthetic fibers when towed in air at high speeds of modern aircraft contribute to the capturing and retaining of mineral particles necessary to aerial prospecting procedures as aforesaid.

The success of the present invention is further due to the fact that mineral particles collected upon fine threads or fibers of synthetic polymer material may be concentrated and handled for subsequent analysis purposes without recourse to solvents or use of other liquids. This is accomplished by taking the thread upon which particles have been collected and drawing it across a pad or block of particle retentive material which transfers the particles from the thread to the retentive material, concentrating the transferred particles in a thin line upon the retentive material defined by the passage of the dry thread across the pad or block.

In a preferred embodiment of the collection procedures in which one long continuous thread or filament of nylon or similar synthetic fiber is wound between a plurality of frame members, the continuous thread or filament after being towed from an aircraft at suitable elevation to produce collection on the thread of airborne mineral particles, is unwound from the frame and the continuous thread or filament is pulled through a pad under pressure or through a hole made in a block whereby mineral particles upon the thread or filament are removed and retained upon the pad or the surface of the hole in the block.

### BRIEF DESCRIPTION OF THE DRAWING

A further understanding of the new methods and devices of this invention may be had by reference to the accompanying drawings in which:

FIGURE 1 is a diagrammatic representation of one form of particle collection device of the invention.